

CONSERVATION COMMISSION OF WESTERN AUSTRALIA - REPORT ON THE OLD GROWTH NOMINATION WITHIN GREGORY FOREST BLOCK - COMPARTMENT 03

Executive Summary

In May 2008, the Conservation Commission received a public nomination for a review of old-growth forest status within Gregory forest block compartment 03. The nominated area was approximately 333 ha (hectares).

- Dieback interpretation mapping designated the area as predominantly 'dieback free' apart from three small infestations of dieback of less than 2 hectares in total.
- Stump mapping data was provided by the DEC which contributed to the development of a general distribution map of past logging within the block east of Weatherly Road. An area of approximately 126.5 ha was identified as old growth forest by the DEC as indicated in Map 1.
- Further assessments were conducted by Conservation Commission audit staff in January 2007. These surveys included verification of DEC stump data, independent stump data and canopy sampling of areas that could potentially meet the requirements of minimally disturbed old-growth.
- An additional area of approximately 25.3 ha has been identified by the Conservation Commission as meeting the criteria of minimally disturbed old-growth forest. This area has been added to the 126.5 ha previously identified as old-growth forest by the DEC. **A combined area of 151.8 ha has been determined as unavailable for timber harvesting.**

Background

This report summarises the Conservation Commission's findings based on its consideration of available records and inputs and field sampling undertaken by the Conservation Commission audit staff.

The following old-growth definition applies for the forest type within the assessment area:

Jarrah and jarrah/tingle forest: "uncut forest or forest subject to minimal disturbance which is not known to be affected by *Phytophthora cinnamomi*".

According to the Conservation Commission's paper *Assessment criteria and process for the Conservation Commission review of old-growth amendments* the effects of disturbance are considered more than minimal where changes to the structure of the overstorey caused by these disturbances are still evident or where changes to the overstorey or understorey are irreversible.

Public nomination of old-growth

As required in the *Forest Management Plan 2004-2013* (FMP) and further detailed in the Conservation Commission's paper *Assessment criteria and process for the Conservation Commission review of old-growth amendments*, there is a process for persons to request the Conservation Commission to assess whether areas on an indicative timber harvest plan should be classified as old-growth forest in the Department of Environment and Conservation's (DEC)

corporate database. Such a request was received on 5 May 2008 in relation to Gregory block compartment 03.

Site Description

Gregory forest block compartment 03 is an area of approximately 333 ha located approximately 20km east of the town of Nannup. A ridge line at 280m above sea level acts as a watershed and divides the coupe through the centre from north to south. Slope becomes more pronounced (up to 25 degrees) near streams which drain to the west and to the east of the ridge. A pine plantation lies adjacent to the northern boundary of the coupe.

Old fence lines are still evident in the field and demarcate previous boundaries within the coupe. These boundaries are likely to be previous leases or permit areas and are indicated on Map 2.

In some areas of the coupe there are a significant number of large windfall logs. This suggests there may have been a severe weather event through the area. A number of large mature/senescent trees, particularly blackbutt are infested with white-ants. This may also have contributed to the high amount of windfall.

Forest types

The general description of forest type for the coupe is jarrah forest. There was some variation in the predominance of marri and blackbutt in some areas of the coupe. A description of specific forest types in the sample plots are as follows:

Southern plot 1: predominantly blackbutt & marri with occasional jarrah;

Southwest plot 2: mixed jarrah & marri;

Central plot 3: blackbutt & marri;

Northeast plot 4: mixed jarrah & marri with the occasional blackbutt; and

Northwest plot 5: Northern section mixed jarrah & marri, western section, predominantly marri with some jarrah.

Sampling Process

Sampling followed the process outlined in the document *Assessment criteria and process for the Conservation Commission review of old-growth amendments*. The nomination area was reviewed and sample areas were defined using the following background information:-

Remote Analysis

The remote analysis utilised:

- digitised aerial photos and data layers to confirm forest and non-forest structural boundaries and general observations in relation to forest structure;
- the latest available harvesting records, dieback sampling and vegetation types as provided by the DEC; and
- stump distribution data as provided by the DEC.

Field Checks

Conservation Commission audit staff verified a portion of stump survey work completed by the DEC. In addition five isolated sample plots were selected to undertake additional survey work for potential old growth. These sample plots were chosen based on stump distribution, obvious forest structural variation evident from orthographic images, forest structure changes adjacent to property boundaries, and general field observations. Areas that were identifiable as regrowth forest (from DEC supplied information, remote imagery and an initial field inspection) were not sampled.

The following summarises the field work undertaken in each of the identified plot sampling areas:-

Southern plot 1: Field observations indicated there was an obvious structural difference between forest south of the central lease area and north of a southern lease boundary. A sample area was chosen and transect surveys were run from west to east with canopy and stump sampling undertaken at 47m intervals.

Southwest plot 2: A sample area was chosen west of the stream buffer and east of the Bibbulmun track buffer. Transect surveys were run parallel to the buffers and canopy and stump sampling was undertaken at 47m intervals.

Central plot 3: A sample area was chosen from a section of non old-growth, as determined by the DEC where the stump distribution map indicated between 2 & 10 stumps per hectare. Canopy sampling at 20m intervals was undertaken in this plot.

Northeast plot 4: A sample area was chosen from a section of non old-growth, as determined by the DEC where the stump distribution map indicated between 2 & 10 stumps per hectare. Canopy sampling at 20m intervals as well as verification of DEC stump mapping was undertaken.

Northwest plot 5: Field observations indicated there was an obvious structural difference between forest north and west of the central lease boundary and forest inside the central lease boundary. Canopy and stump data was initially collected using a 47m sampling grid. A comprehensive stump distribution survey was then undertaken to provide a more accurate stump distribution map.

Other observations were made in relation to slope, streams and general disturbances to the forest evident during field work

Findings

Harvesting records provided by the DEC for Gregory 03 indicate harvesting which coincides with the central lease area during the period 1970-1979 (see Map 2). The presence of stumps combined with orthographic images and field observations of forest structure confirmed that this area has been extensively harvested and is predominantly regrowth forest.

Harvesting records for remaining areas outside the central lease boundary indicate harvesting during the period 1930-1939. The selective nature of this harvesting is reflected in the stump distribution maps where steeper areas within the coupe have been less intensively harvested or not harvested. It is within these areas that additional old-growth has been found.

Other disturbances include a large amount of stumps as a result of pole cutting and firewood cutting, close to roads. This is assumed from the number of stumps of around 15-30cm in diameter.

The most recent dieback samples taken within Gregory 03 indicate the area to be predominantly free of dieback apart from two small infestations along the creek line east of Weatherly Road and 1 localised infestation in the north-west corner of the coupe. The dieback interpretation map included these small infestations for hygiene management purposes, however the areas infected (less than 2 hectares in total) were not sufficient in area to preclude any areas from being old-growth forest due to the presence of dieback.

Findings in relation to the sampling areas are summarized as follows:-

Southern plot 1

DEC records indicate the area identified as Southern plot 1 in this report was harvested during the period 1930-1939. Sampling revealed an estimated stump concentration of 5 stumps per hectare. Canopy sampling within the area of additional old-growth estimated 72.2% mature/senescent component to the overstorey. ***The 9.8 ha identified as additional old-growth will be added to the old-growth layer and will not be available for timber harvesting.***

An even age mass stand of regrowth forest with a small proportion of mature trees was observed south of the area identified as additional old-growth. Results from canopy sampling in this area supported these observations (See Appendix 1 non old-growth).

The area sampled west of the track was harvested at a greater intensity where the proportion of mature/senescent trees in the overstorey did not meet the requirements for minimally disturbed old-growth (See Appendix 1 non old-growth).

Southwest plot 2

DEC records indicate the area identified as Southwest plot 2 in this report was harvested during the period 1930-1939. Canopy sampling within the area estimated a 44.9% mature/senescent component to the overstorey. The proportion of mature/senescent trees in the overstorey for similar forest types within the coupe (Northeast plot 4 & Northwest plot 5) determined to be old-growth were in excess of 57%, significantly higher than the reading for Southwest plot 2. ***Therefore this area does not meet the minimum requirements for old-growth and will remain available for timber harvesting.***

Central plot 3

DEC records indicate that the area identified as Central plot 3 in this report was harvested in the period 1970-1979. Stump distribution data provided by the DEC found an estimated stump concentration of 6 stumps per hectare. Canopy sampling estimated a 30% mature/senescent component to the overstorey. ***Therefore this area does not meet the minimum requirements for old-growth and will remain available for timber harvesting.***

Northeast plot 4

DEC records indicate that the 2 ha area identified as Northeast plot 4 in this report was harvested in the period 1970-1979. Conservation Commission audit staff verified the DEC stump distribution mapping in this area to be accurate. Stump distribution data provided by the DEC found an estimated stump concentration of 4 stumps per hectare. Further canopy sampling

estimated a proportion of 60% mature/senescent component to the overstorey. Even though the records indicate logging in the period 1970-79, the area slopes to the east and this may have limited the historical logging activities in this vicinity. **The 2 ha identified as additional old-growth will be added to the old-growth layer and will not be available for timber harvesting.**

Northwest plot 5

DEC records indicate that the area identified as Northwest plot 5 in this report was harvested in the period 1930-1939. Canopy sampling within the area of additional old-growth estimated 57.1% mature/senescent component to the overstorey. A comprehensive stump distribution survey was then undertaken by Commission audit staff. This revealed a stump concentration to be an estimated 2 stumps per hectare. A higher concentration of stumps was observed within the adjacent central lease area. There were also a number of smaller stumps within close proximity to roads. The size (diameter of 15-30cm) and location of these stumps would indicate that they were taken by pole cutters or firewood cutters. **The 13.5 ha identified as additional old-growth will be added to the old-growth layer and will not be available for timber harvesting.**

Summary

Therefore in summary:-

- Sampling focused on 5 isolated sections of the block: Southern plot 1; Southwest plot 2; Central plot 3; Northeast plot 4; Northwest plot 5 as indicated in Map 2.
- The assessment yielded the following results:

Table 1 Sample Results.

Sample areas	Estimated total upper crown cover	Estimated upper crown proportion of mature or senescent trees	Estimated upper crown proportion of regrowth trees	Estimated number of stumps per hectare
Southern plot 1	76.6%	72.2%	28.8%	5
Southwest plot 2	84.5%	44.9%	55.1%	6
Central plot 3	71.4%	30%	70%	6
Northeast plot 4	75.8%	60%	40%	4
Northwest plot 5	71%	57.1%	42.9%	2

Southern plot 1 (9.8 ha); Northeast plot 4 (2 ha) & Northwest plot 5 (13.5 ha) are consistent with the following old-growth forest criteria for this forest type:-

- areas are greater than 2 ha in size;
- areas have between 2 and 10 stumps per hectare; and
- areas have more than 50% upper crown proportion of mature and/or senescent trees.

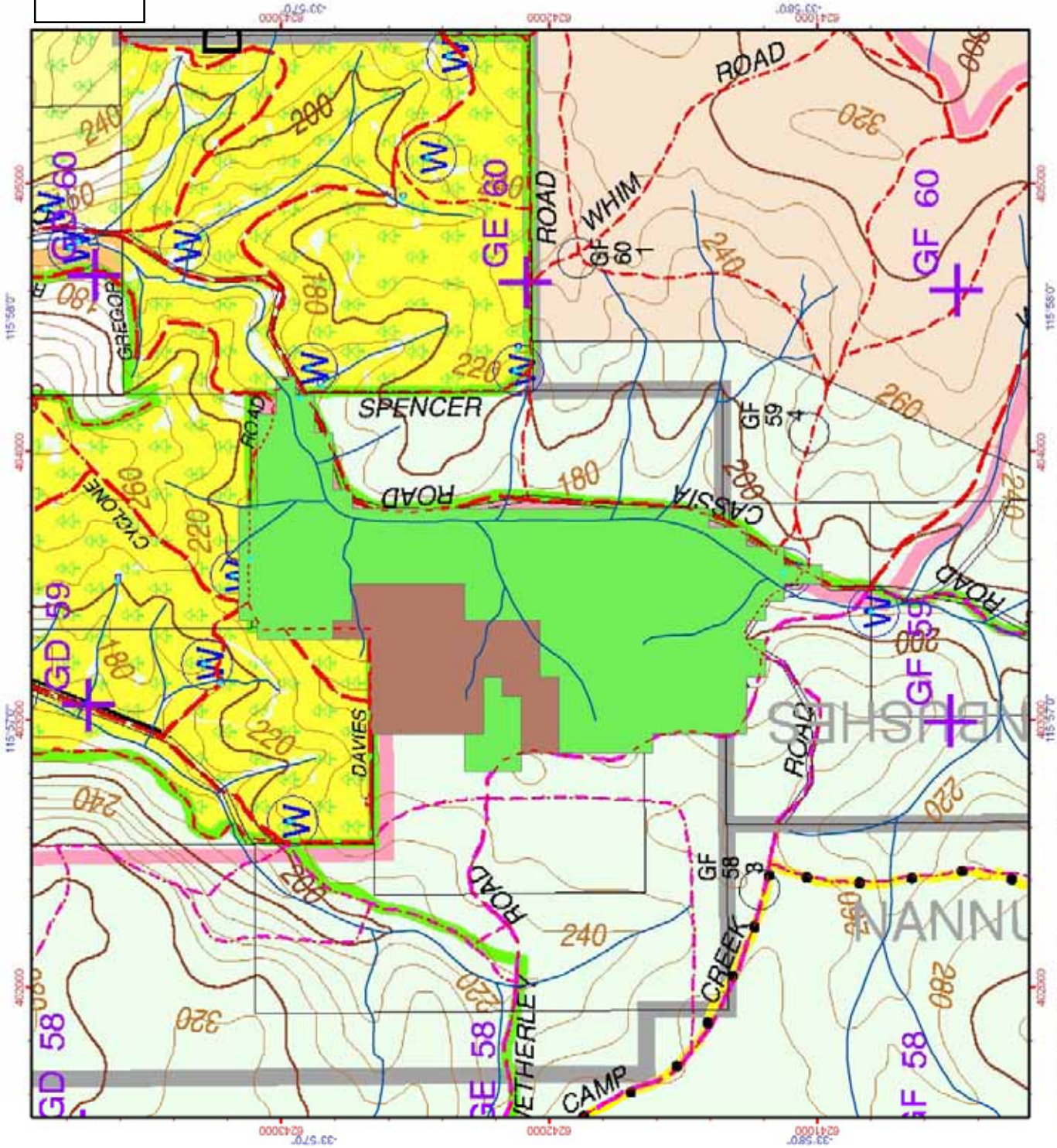
Therefore an area of approximately 25.3 ha meets the criteria of minimally disturbed old-growth forest. These areas have been added to the 126.5 ha previously identified as old-growth forest by the DEC. ***A combined area of 151.8 ha has been determined as unavailable for timber harvesting.***

Central plot 3 (5 ha) identified in this report is consistent with DEC mapping and does not meet the minimum requirements for old-growth forest and will remain available for timber harvesting.

Southwest plot 2 (20 ha) identified in this report is consistent with DEC mapping and does not meet the minimum requirements of old-growth forest and will remain available for timber harvesting.

Other forested areas within the coupe do not meet the requirements for old-growth forest and will remain available for timber harvesting.

Map 1 DEC mapping of
old-growth Gregory 03



Legend
 Cut Over Forest
 Old Growth Forest



1:20,000 (A4)
 0 250 500 1,000
 Metres

Projection: Universal Transverse Mercator
 MGA Zone 50, Datum: GDA94

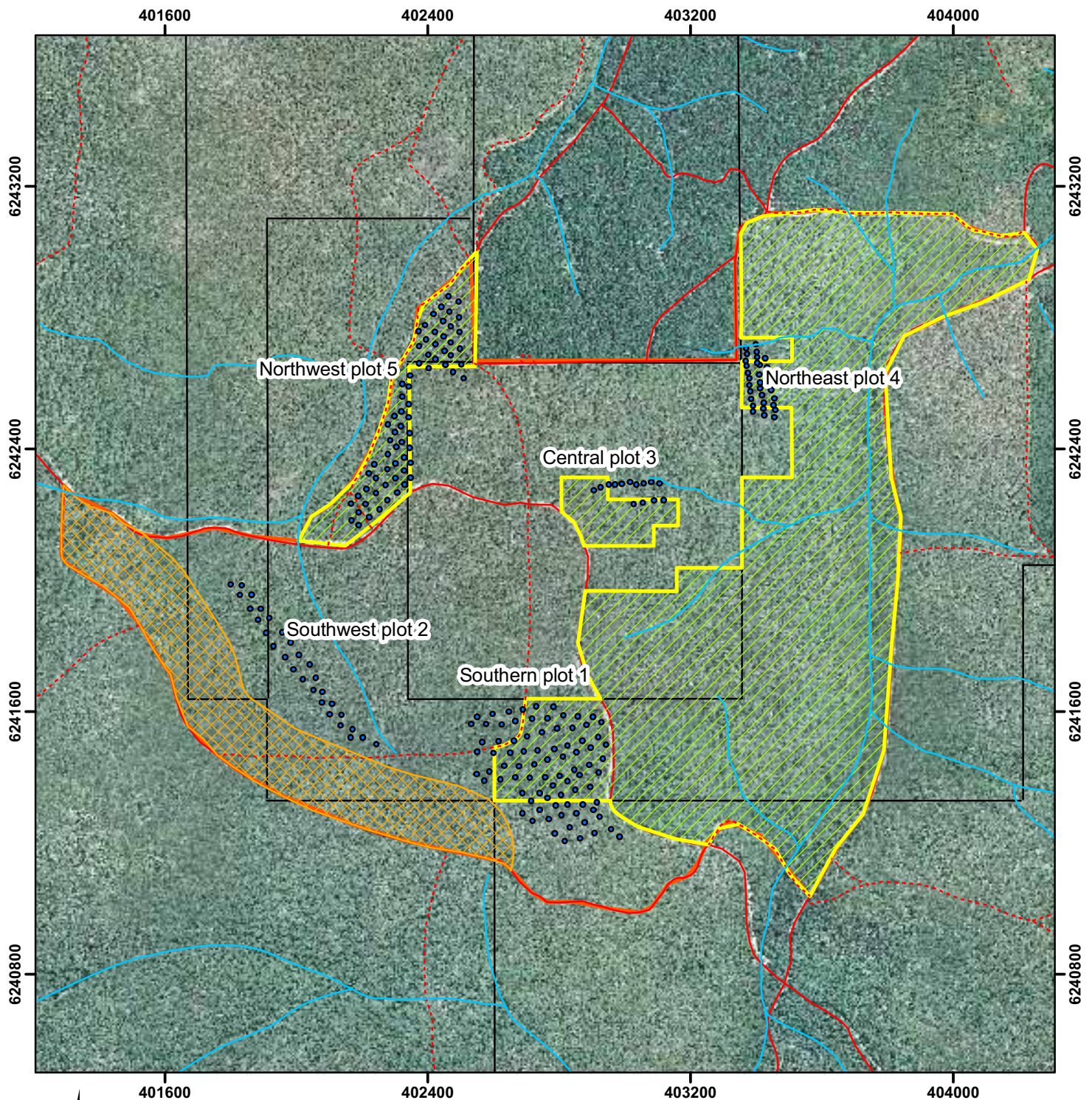


Produced by Forest Management Branch
 under the Direction of Kerian Mollama
 Director General, Department of
 Environment and Conservation

Grid shown at 1 minute intervals
 Grid shown at 1000 metre intervals
 The Dept. of Environment and Conservation does not guarantee that this map is without flaw of any kind
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Produced on July 10, 2008

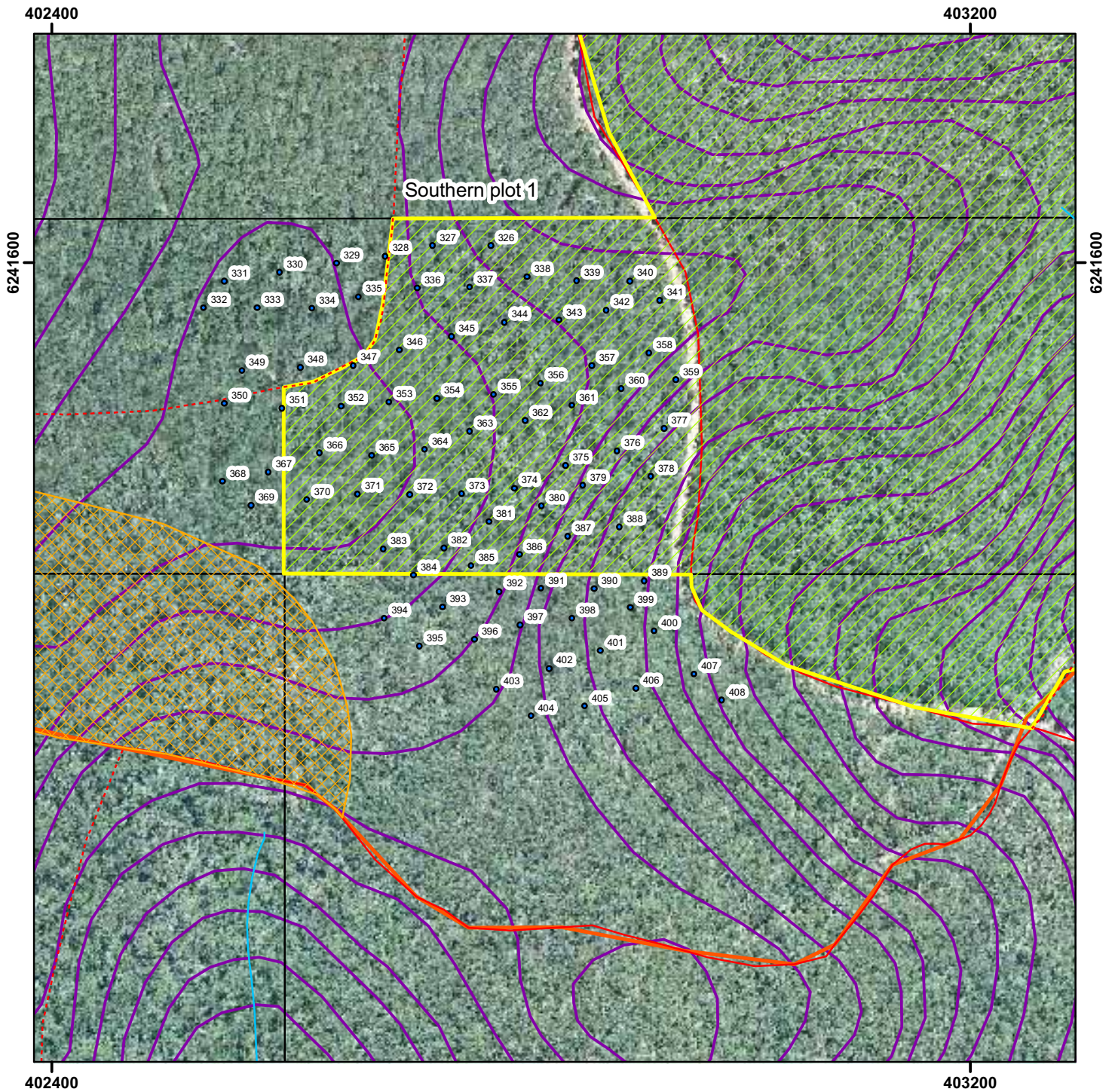
Map 2 Additional old-growth Gregory 03



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Legend	
	Streams
	Sample points
	Bibbulmun buffer
	Tracks
	Additional old growth
	Unsealed roads
	Nomination area
	Old lease boundary

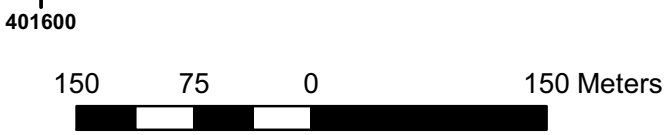
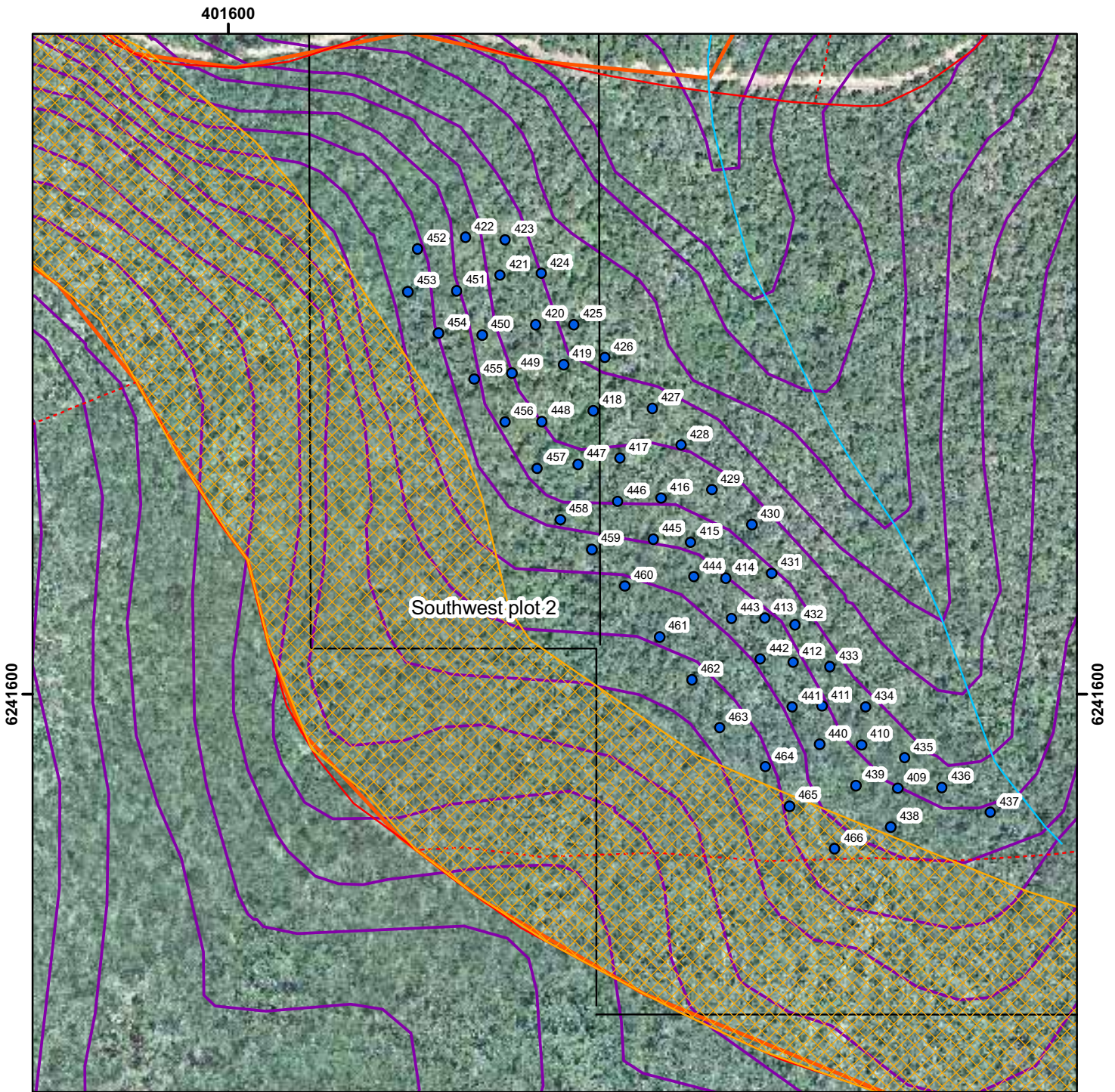
Map 3 Southern plot 1 additional old-growth



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Legend	
	Streams
	Sample points
	Bibbulmun buffer
	Tracks
	Additional old growth
	Unsealed roads
	Nomination area
	Old lease boundary
	Contours

Map 4 Southwest plot 2

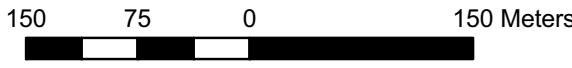
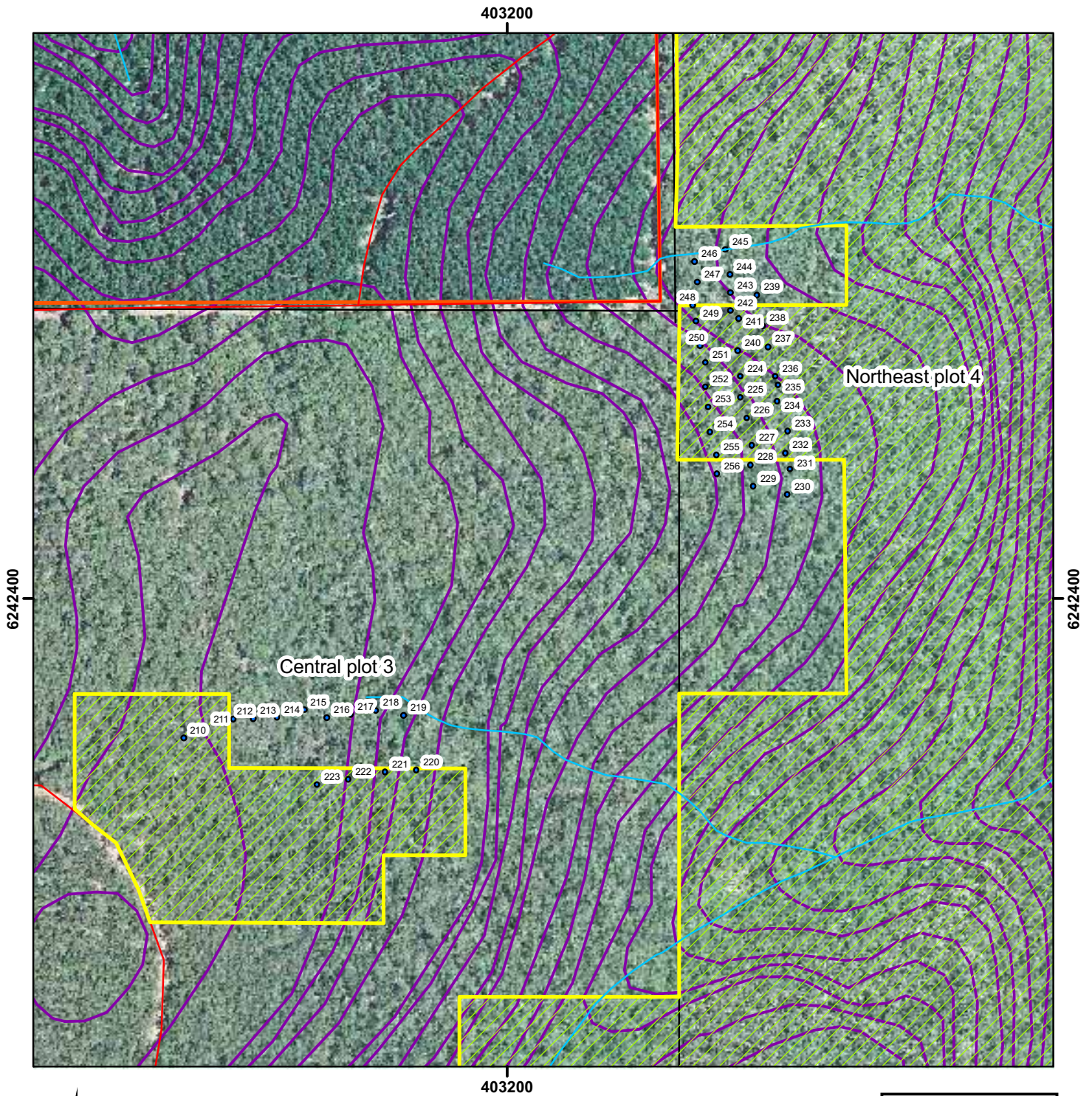


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Legend










- Streams
- Bibbulmun buffer
- - - Tracks
- Unsealed roads
- Nomination area
- Old lease boundary
- Contours
- Sample points

Map 5 Central plot 3 & Northeast plot 4 additional old-growth

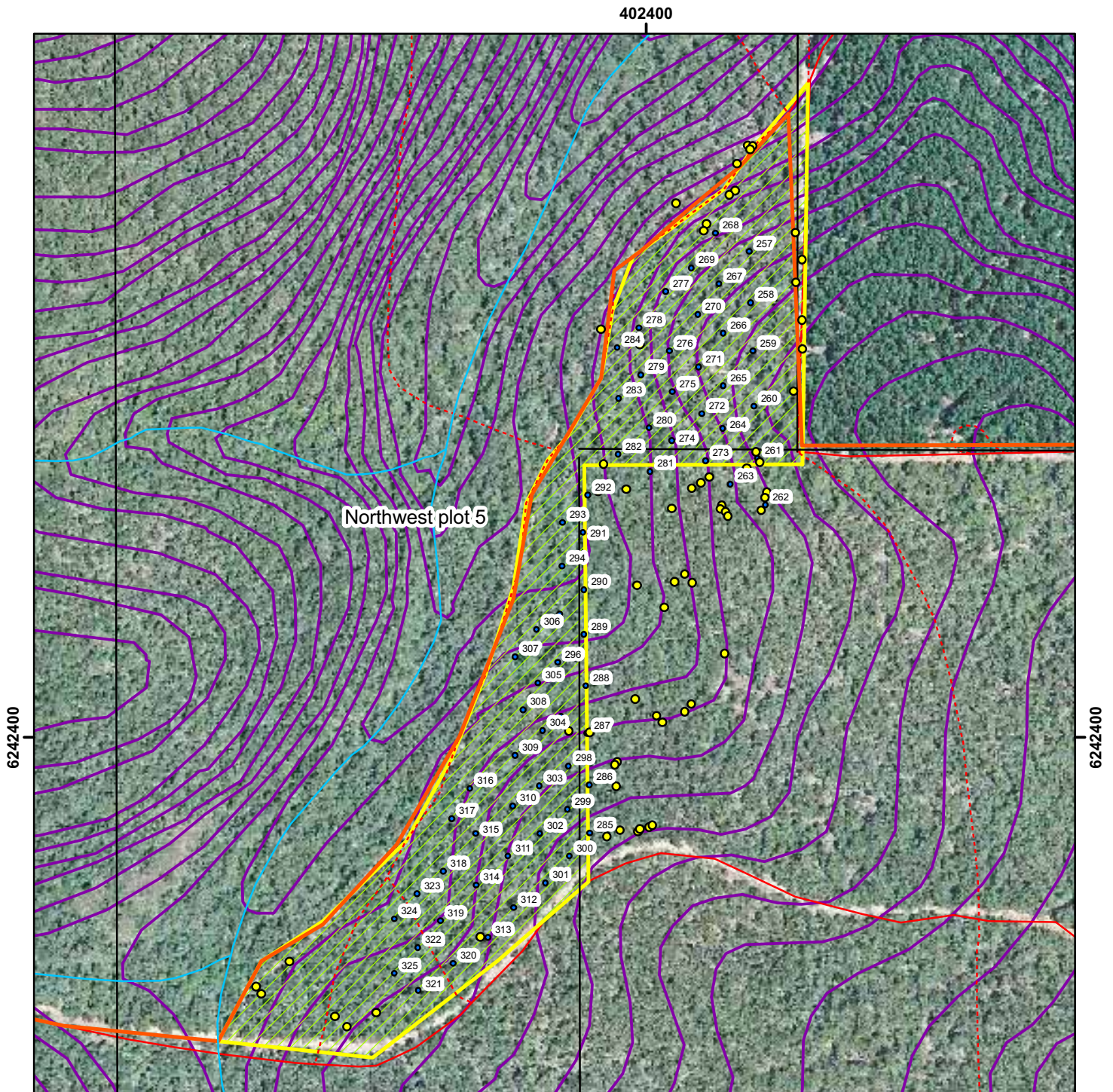


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Legend

-  Streams
-  Sample points
-  Bibbulmun buffer
-  Tracks
-  Additional old growth
-  Unsealed roads
-  Nomination area
-  Old lease boundary
-  Contours

Map 6 Northwest plot 5 additional old-growth



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Legend	
	Streams
	Stumps
	Sample points
	Nomination area
	Old lease boundary
	Tracks
	Additional old growth
	Unsealed roads
	Contours

Appendix 1 Southern plot 1 raw data

FID	CANOPY	SPECIES	DIAMETER	DEVELOPMENT	STUMPS	DISTURBANCE	QUALITATIVE
326	YES	BBUTT	100	MATURE/SENESCENT	0		MIXED
327	NO	GAP	0	GAP	0		GAP
336	YES	BBUTT	170	MATURE/SENESCENT	0		MOSTLY UPPER
337	YES	MARRI	50	REGROWTH	1		MIXED
338	YES	JARRAH	80	MATURE/SENESCENT	0		MOSTLY UPPER
339	NO	GAP	0	GAP	0		GAP
340	YES	JARRAH	150	MATURE/SENESCENT	0		MOSTLY UPPER
341	YES	JARRAH	40	REGROWTH	0		MOSTLY LOWER
342	NO	GAP	0	GAP	1		GAP
343	YES	MARRI	70	MATURE/SENESCENT	0		MIXED
344	NO	GAP	0	GAP	0		GAP
345	YES	BBUTT	90	MATURE/SENESCENT	0		MOSTLY UPPER
346	NO	GAP	0	GAP	0		GAP
347	YES	JARRAH	100	MATURE/SENESCENT	0		MIXED
352	NO	GAP	0	GAP	1		MOSTLY LOWER
353	YES	BBUTT	150	MATURE/SENESCENT	1	X-CUT LOG_	MOSTLY UPPER
354	NO	GAP	0	GAP	0		GAP
355	YES	BBUTT	90	MATURE/SENESCENT	0		MIXED
356	YES	MARRI	100	MATURE/SENESCENT	1		MIXED
357	YES	MARRI	20	REGROWTH	0	X-CUT LOG_	MOSTLY LOWER
358	YES	MARRI	30	REGROWTH	0		MIXED
359	YES	JARRAH	130	MATURE/SENESCENT	0	X-CUT LOG_	MIXED
360	YES	MARRI	100	MATURE/SENESCENT	0		MOSTLY UPPER
361	YES	BBUTT	130	MATURE/SENESCENT	0		MOSTLY UPPER
362	NO	GAP	0	GAP	0		GAP
363	YES	BBUTT	30	REGROWTH	2		MOSTLY LOWER
364	YES	BBUTT	110	MATURE/SENESCENT	0		MOSTLY UPPER
365	YES	BBUTT	220	MATURE/SENESCENT	0		MIXED
366	YES	MARRI	140	MATURE/SENESCENT	0		MIXED
370	YES	BBUTT	130	MATURE/SENESCENT	0		MIXED
371	YES	MARRI	30	REGROWTH	1		MIXED
372	NO	GAP	0	GAP	0		GAP
373	YES	MARRI	80	MATURE/SENESCENT	0		MOSTLY UPPER
374	YES	MARRI	60	REGROWTH	0		MIXED
375	YES	MARRI	100	MATURE/SENESCENT	0		MOSTLY UPPER
376	YES	MARRI	60	REGROWTH	0		MIXED
377	YES	BBUTT	220	MATURE/SENESCENT	0		MOSTLY UPPER
378	YES	MARRI	90	MATURE/SENESCENT	0		MIXED
379	YES	MARRI	50	REGROWTH	0		MIXED
380	YES	MARRI	120	MATURE/SENESCENT	0		MOSTLY UPPER
381	YES	BBUTT	100	MATURE/SENESCENT	0		MIXED
382	YES	JARRAH	70	MATURE/SENESCENT	0		MOSTLY UPPER
383	NO	GAP	0	GAP	0		GAP
385	YES	BBUTT	120	MATURE/SENESCENT	0		MOSTLY UPPER
386	NO	GAP	0	GAP	1		GAP
387	YES	MARRI	40	REGROWTH	0		MIXED
388	YES	BBUTT	140	MATURE/SENESCENT	0		MOSTLY UPPER

Appendix 1 Southern plot 1 raw data non old-growth

FID	CANOPY	SPECIES	DIAMETER	DEVELOPMENT	STUMPS	DISTURBANCE	QUALITATIVE
328	YES	BBUTT	100	MATURE/SENESCENT	0		MIXED
329	YES	BBUTT	250	MATURE/SENESCENT	0		MIXED
330	NO	GAP	0	GAP	0		GAP
331	YES	JARRAH	20	REGROWTH	0		MOSTLY LOWER
332	NO	GAP	0	GAP	2		GAP
333	YES	MARRI	40	REGROWTH	0		MIXED
334	YES	JARRAH	40	REGROWTH	0		MIXED
335	YES	BBUTT	30	REGROWTH	0		GAP
348	YES	MARRI	20	REGROWTH	0		MOSTLY LOWER
349	YES	MARRI	40	REGROWTH	0		MIXED
350	YES	JARRAH	40	REGROWTH	0		MIXED
351	YES	MARRI	50	REGROWTH	0		MIXED
367	YES	MARRI	30	REGROWTH	0		MIXED
368	NO	GAP	0	GAP	1		GAP
369	NO	GAP	0	GAP	0		GAP
384	YES	JARRAH	50	REGROWTH	0		MIXED
389	YES	BBUTT	50	REGROWTH	0		MIXED
390	YES	MARRI	50	REGROWTH	0		MOSTLY UPPER
391	YES	MARRI	20	REGROWTH	0		MIXED
392	YES	BBUTT	50	REGROWTH	0		MOSTLY UPPER
393	YES	JARRAH	140	MATURE/SENESCENT	0		MOSTLY UPPER
394	YES	MARRI	40	REGROWTH	0		MOSTLY UPPER
395	YES	BBUTT	40	REGROWTH	0		MOSTLY UPPER
396	YES	MARRI	50	REGROWTH	0		MOSTLY UPPER
397	YES	MARRI	50	REGROWTH	0		MIXED
398	YES	BBUTT	40	REGROWTH	0		MOSTLY UPPER
399	YES	BBUTT	60	REGROWTH	0		MOSTLY UPPER
400	YES	MARRI	50	REGROWTH	0		MOSTLY UPPER
401	YES	MARRI	60	MATURE/SENESCENT	0		MOSTLY UPPER
402	YES	JARRAH	140	MATURE/SENESCENT	0		MOSTLY UPPER
403	YES	MARRI	50	REGROWTH	0		MOSTLY UPPER
404	YES	MARRI	30	REGROWTH	0		MOSTLY UPPER
405	YES	BBUTT	50	REGROWTH	0		MOSTLY UPPER
406	YES	MARRI	40	REGROWTH	0		MOSTLY UPPER
407	YES	BBUTT	70	MATURE/SENESCENT	0		MOSTLY UPPER
408	YES	BBUTT	40	REGROWTH	0		MOSTLY UPPER

APPENDIX 2 Southwest plot 2 raw data

FID	CANOPY	SPECIES	DBH	DEVELOPMENT	STUMPS	DISTURBANCE	QUALITATIVE
409	YES	JARRAH	30	REGROWTH	0		MIXED
410	YES	JARRAH	50	REGROWTH	0		MIXED
411	YES	JARRAH	50	REGROWTH	0	TREEHEAD	MIXED
412	YES	MARRI	100	MATURE/SENESCENT	0		MOSTLY UPPER
413	YES	MARRI	80	MATURE/SENESCENT	0		MOSTLY UPPER
414	YES	JARRAH	90	MATURE/SENESCENT	0		MOSTLY UPPER
415	YES	MARRI	30	REGROWTH	0		MIXED
416	YES	MARRI	30	REGROWTH	1	TREEHEAD	MIXED
417	YES	BBUTT	50	REGROWTH	0	TREEHEAD	MIXED
418	YES	MARRI	60	REGROWTH	0	TREEHEAD	MOSTLY LOWER
419	NO		0	GAP	0		GAP
420	NO		0	GAP	0		GAP
421	YES	MARRI	20	REGROWTH	0		MIXED
422	YES	JARRAH	100	MATURE/SENESCENT	1		MOSTLY UPPER
423	YES	MARRI	30	REGROWTH	1		MIXED
424	YES	MARRI	30	REGROWTH	0		MIXED
425	YES	MARRI	100	MATURE/SENESCENT	0		MOSTLY UPPER
426	YES	MARRI	80	MATURE/SENESCENT	0		MIXED
427	YES	MARRI	70	MATURE/SENESCENT	0		MOSTLY UPPER
428	YES	MARRI	50	REGROWTH	1		MIXED
429	YES	MARRI	40	REGROWTH	0		MIXED
430	YES	JARRAH	40	REGROWTH	0		MIXED
431	YES	JARRAH	120	MATURE/SENESCENT	0		MOSTLY UPPER
432	YES	JARRAH	60	REGROWTH	0		MIXED
433	YES	JARRAH	70	MATURE/SENESCENT	0		MIXED
434	YES	JARRAH	80	MATURE/SENESCENT	0		MOSTLY UPPER
435	YES	JARRAH	120	MATURE/SENESCENT	0		MOSTLY UPPER
436	YES	MARRI	100	MATURE/SENESCENT	1		MOSTLY UPPER
437	YES	JARRAH	80	MATURE/SENESCENT	0		MOSTLY UPPER
438	YES	JARRAH	50	REGROWTH	0		MIXED
439	YES	JARRAH	40	REGROWTH	0	SNIGTRACK	MIXED
440	NO	GAP	0	GAP	2		GAP
441	YES	MARRI	120	MATURE/SENESCENT	0		MIXED
442	NO	GAP	0	GAP	0		GAP
443	YES	MARRI	20	REGROWTH	0		MIXED
444	YES	JARRAH	90	MATURE/SENESCENT	0		MOSTLY UPPER
445	YES	JARRAH	90	MATURE/SENESCENT	0		MOSTLY UPPER
446	NO	GAP	0	GAP	0		GAP
447	YES	MARRI	110	MATURE/SENESCENT	0		MIXED
448	NO	GAP	0	GAP	0		GAP
449	YES	JARRAH	40	REGROWTH	2		MOSTLY LOWER
450	YES	JARRAH	60	REGROWTH	0	X-CUT LOG_	MIXED
451	YES	JARRAH	30	REGROWTH	0		MIXED
452	YES	JARRAH	50	REGROWTH	0		MIXED
453	NO	GAP	0	GAP	0		GAP
454	YES	MARRI	70	MATURE/SENESCENT	0		MOSTLY UPPER
455	YES	JARRAH	30	REGROWTH	0		MIXED
456	YES	MARRI	50	REGROWTH	0	SNIGTRACK	MIXED
457	YES	MARRI	80	MATURE/SENESCENT	0		MIXED
458	YES	MARRI	120	MATURE/SENESCENT	0		MOSTLY UPPER
459	YES	JARRAH	40	REGROWTH	0		MIXED
460	YES	JARRAH	140	MATURE/SENESCENT	0		MOSTLY UPPER
461	YES	MARRI	90	MATURE/SENESCENT	0		MIXED
462	YES	MARRI	20	REGROWTH	1		MIXED
463	YES	MARRI	40	REGROWTH	0		MOSTLY LOWER
464	NO	GAP	0	GAP	0	SNIGTRACK	MOSTLY LOWER
465	YES	JARRAH	40	REGROWTH	0		MIXED
466	NO	GAP	0	GAP	0		GAP

Appendix 3 Central plot 3 raw data

FID	CANOPY	SPECIES	DIAMETER	DEVELOPMENT	STUMPS	DISTURBANCE	QUALITATIVE
210	YES	BBUTT	40	REGROWTH	0		MIXED
211	YES	BBUTT	40	REGROWTH	0		MOSTLY UPPER
212	YES	BBUTT	50	REGROWTH	0		MIXED
213	YES	MARRI	40	REGROWTH	0		MIXED
214		BBUTT	60	MATURE/SENESCENT	0		MOSTLY UPPER
215	YES	MARRI	60	MATURE/SENESCENT	0		MIXED
216	YES	BBUTT	100	MATURE/SENESCENT	0		MIXED
217	NO	GAP	0	GAP	0		GAP
218	NO	GAP	0	GAP	0		GAP
219	NO	GAP	0	GAP	0		GAP
220	YES	BBUTT	20	REGROWTH	0		MOSTLY LOWER
221	NO	GAP	0	GAP	0		GAP
222	YES	BBUTT	30	REGROWTH	0		MOSTLY LOWER
223	YES	BBUTT	20	REGROWTH	0		MIXED

Appendix 4 Northeast plot 4 raw data

FID	CANOPY	SPECIES	DIAMETER	DEVELOPMENT	STUMPS	DISTURBANCE	QUALITATIVE
224	YES	JARRAH	120	MATURE/SENESCENT	0		MIXED
225	YES	JARRAH	100	MATURE/SENESCENT	0		MIXED
226	NO	GAP	0	GAP	0		GAP
227	YES	JARRAH	120	MATURE/SENESCENT	0		MIXED
228	YES	MARRI	30	REGROWTH	0		MIXED
229	YES	JARRAH	100	MATURE/SENESCENT	0		MIXED
230	YES	MARRI	100	MATURE/SENESCENT	0		MIXED
231	YES	BBUTT	100	MATURE/SENESCENT	0		MIXED
232	NO	GAP	0	GAP	0		GAP
233	NO	GAP	0	GAP	0		GAP
234	NO	GAP	0	GAP	0		GAP
235	YES	JARRAH	80	MATURE/SENESCENT	0		MOSTLY UPPER
236	YES	JARRAH	90	MATURE/SENESCENT	0		MOSTLY UPPER
237	YES	JARRAH	70	MATURE/SENESCENT	0		MOSTLY UPPER
238	YES	JARRAH	60	REGROWTH	0		MOSTLY UPPER
239	YES	MARRI	25	REGROWTH	0		MIXED
240	NO	GAP	0	GAP	0		GAP
241	YES	MARRI	30	REGROWTH	0		MIXED
242	YES	JARRAH	75	MATURE/SENESCENT	0		MIXED
243	YES	MARRI	120	MATURE/SENESCENT	0		MOSTLY UPPER
244	YES	BBUTT	30	REGROWTH	0		MOSTLY LOWER
245	NO	GAP	0	GAP	0		GAP
246	YES	MARRI	40	REGROWTH	0		MIXED
247	YES	BBUTT	30	REGROWTH	0		MOSTLY LOWER
248	YES	BBUTT	50	MATURE/SENESCENT	0		MIXED
249	YES	MARRI	30	REGROWTH	0		MOSTLY LOWER
250	NO	GAP	0	GAP	0		GAP
251	NO	GAP	0	GAP	0		GAP
252	YES	MARRI	20	REGROWTH	0		MOSTLY LOWER
253	YES	MARRI	35	REGROWTH	0		MIXED
254	YES	JARRAH	150	MATURE/SENESCENT	0		MIXED
255	YES	JARRAH	130	MATURE/SENESCENT	0		MOSTLY UPPER
256	YES	JARRAH	130	MATURE/SENESCENT	0		MIXED

Appendix 5 Northwest plot 5 raw data

FID	CANOPY	SPECIES	DIAMETER	DEVELOPMENT	STUMPS	DISTURBANCE	QUALITATIVE
257	YES	MARRI	30	REGROWTH	0		MOSTLY LOWER
258	YES	JARRAH	20	REGROWTH	0		MOSTLY LOWER
259	NO	GAP	0	GAP	0		GAP
260	NO	GAP	0	GAP	0		GAP
261	YES	JARRAH	80	MATURE/SENESCENT	1		MOSTLY UPPER
262	YES	MARRI	40	REGROWTH	1		MOSTLY LOWER
263	YES	JARRAH	40	REGROWTH	0		MOSTLY LOWER
264	NO	GAP	0	GAP	0		GAP
265	YES	MARRI	50	REGROWTH	0		MIXED
266	YES	JARRAH	120	MATURE/SENESCENT	0		MIXED
267	YES	MARRI	90	MATURE/SENESCENT	0		MIXED
268	YES	JARRAH	90	MATURE/SENESCENT	0		MOSTLY UPPER
269	NO	GAP	0	GAP	0		GAP
270	YES	MARRI	80	MATURE/SENESCENT	0		MOSTLY UPPER
271	YES	JARRAH	70	MATURE/SENESCENT	0		MOSTLY UPPER
272	YES	MARRI	50	REGROWTH	0		MOSTLY UPPER
273	YES	JARRAH	100	MATURE/SENESCENT	1		MOSTLY UPPER
274	YES	MARRI	20	REGROWTH	0		MIXED
275	YES	MARRI	120	MATURE/SENESCENT	0		MOSTLY UPPER
276	YES	JARRAH	120	MATURE/SENESCENT	0		MOSTLY LOWER
277	YES	JARRAH	130	MATURE/SENESCENT	0		MIXED
278	YES	MARRI	40	REGROWTH	0		MIXED
279	NO	GAP	0	GAP	0		GAP
280	YES	MARRI	150	MATURE/SENESCENT	0		MOSTLY UPPER
281	NO	GAP	0	GAP	0		GAP
282	YES	JARRAH	50	REGROWTH	1		MIXED
283	NO	GAP	0	GAP	0		GAP
284	YES	MARRI	60	MATURE/SENESCENT	0		MIXED
285	NO	GAP	0	GAP	0		GAP
286	NO	GAP	0	GAP	0		GAP
287	NO	GAP	0	GAP	0		GAP
288	YES	MARRI	50	REGROWTH	0	X-CUT LOG_	MIXED
289	YES	MARRI	20	REGROWTH	0		MOSTLY LOWER
290	YES	MARRI	150	MATURE/SENESCENT	0		MIXED
291	NO	GAP	0	GAP	0		GAP
292	YES	BBUTT	40	REGROWTH	0	TREEHEAD	MIXED
293	YES	MARRI	40	REGROWTH	0		MIXED
294	YES	MARRI	80	MATURE/SENESCENT	0		MOSTLY UPPER
295	YES	BBUTT	70	MATURE/SENESCENT	0		MOSTLY UPPER
296	NO	GAP	0	GAP	0		GAP
297	NO	GAP	0	GAP	0		GAP
298	YES	JARRAH	100	MATURE/SENESCENT	0		MOSTLY UPPER
299	YES	MARRI	120	MATURE/SENESCENT	0		MIXED
300	YES	JARRAH	90	MATURE/SENESCENT	0		MIXED
301	NO	GAP	0	GAP	0		GAP
302	NO	GAP	0	GAP	1		GAP
303	NO	GAP	0	GAP	0		GAP
304	NO	GAP	0	GAP	0		GAP
305	YES	JARRAH	150	MATURE/SENESCENT	0		MIXED
306	YES	MARRI	100	MATURE/SENESCENT	0		MOSTLY UPPER
307	YES	MARRI	130	MATURE/SENESCENT	0		MOSTLY UPPER
308	YES	MARRI	80	MATURE/SENESCENT	0		MIXED
309	YES	MARRI	130	MATURE/SENESCENT	1		MIXED
310	YES	JARRAH	80	MATURE/SENESCENT	0		MIXED
311	YES	JARRAH	20	REGROWTH	0		MOSTLY LOWER
312	YES	JARRAH	140	MATURE/SENESCENT	0		MOSTLY UPPER
313	YES	MARRI	30	REGROWTH	1		MOSTLY LOWER
314	YES	JARRAH	50	REGROWTH	0		MIXED
315	YES	MARRI	30	REGROWTH	1		MIXED
316	YES	MARRI	100	MATURE/SENESCENT	0		MOSTLY UPPER
317	YES	MARRI	30	REGROWTH	0		MOSTLY UPPER
318	YES	MARRI	30	REGROWTH	0		MIXED
319	NO	GAP	0	GAP	0		GAP
320	YES	MARRI	0	REGROWTH	0		MOSTLY UPPER
321	NO	GAP	0	GAP	0		GAP
322	YES	JARRAH	50	REGROWTH	0		MIXED
323	YES	MARRI	80	MATURE/SENESCENT	0		MOSTLY UPPER
324	YES	MARRI	140	MATURE/SENESCENT	0		MIXED
325	NO	GAP	0	GAP	0		GAP